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WITH this number we close the school year and the third volume of of THE AGRICULTURAL STUDENT. In many respects this has been a year of profit and advancement. To be sure, not all of our hopes of the beginning of the year have been realized, but we cannot always expect unadulterated success in our undertakings. For THE AGRICULTURAL STUDENT it has been a year of success and improvement. At the beginning of the year the size of the paper was double that of the preceding volumes. This was merely a trial, but it has proved successful beyond our expectations. It has been a year of success for the College of Agriculture, as the increased number of students will indicate.

For our success in the publication of THE STUDENT we wish to extend our thanks to our many friends, subscribers and advertisers, without whose aid it could not have flourished.

SOME of our readers will no doubt wonder at the delinquency of this number of THE STUDENT. In explanation we would say that as this is the last number for this volume we thought best to hold it back and get in as much new matter as possible.

At the end of this term several of our number step forth from the walls of their *alma mater* to begin their career of usefulness in the outer world. It is often with pleasure that we think that we have completed our college course and our many little trials here shall exist henceforth as mere memories. Again it is with a pang of regret that we think that we must break the many ties of friendship and environment that have been formed during our years of study. We are soon to leave this little world where each of us might feel that he played a part of more or less importance, yes, where each had some influence, to step forth into a greater world and become a minute part of the great machine of society; so small a part, in fact, that he will know and be known to none but his immediate neighbors. We cannot hope for renown or even recognition until we have "won our spurs." There is no royal road to success. But genius will always be rewarded sooner or later, and if we are just to others and honest with ourselves we need not fear the results.

HIGH SCHOOL DAY has come and gone, and many are the young college aspirants whose eyes have been feasted upon the sights, and who have had a taste of the pleasures which the life at the Ohio State University affords. The threatening weather prevented a good many taking advantage of the opportunity, but still there was a goodly number of visitors upon the campus. The benefit which the University derives from this newly initiated occasion is almost

inestimable. Not only are the young persons of the commonwealth brought together at this the head of the public school system, but older persons as well take advantage of the opportunity and come and see us when we are ready to receive visitors. Thus the name of the institution is spread abroad, and it attains that place in the minds of the people at large which can only be attained by direct contact and understanding of its workings.

THE members of Townshend Literary Society will hold a meeting on Thursday evening of State Fair week. The meeting will be held on the University grounds, probably in the Botanical Lecture Room. There will be one or two speakers from abroad, two from the faculty and one from the alumni of the society, and one active member of the society on the program. This meeting is being looked forward to with much interest by the members, alumni and ex-students of the society as a sort of reunion, where we may meet as old friends and renew our acquaintance. Visitors will also be welcome and prospective students in the College of Agriculture are especially invited. By attending this meeting the old students could arrange plans for the work of the society during the coming year, and persons who intend entering college at the beginning of the fall term could become acquainted, so that they would feel more at home when the regular school work begins. Let us have a good attendance and make the most of this opportunity.

Townshend Hall.

The new contractor having the construction of Townshend Hall in charge is pushing the work to completion. A large force of men are constantly at work, and the click of the stone-hammers bespeak the early completion of the hall. The delay

caused by the former contractor's failure to fulfill his agreement is to be regretted, but the present indications point to the completion of the hall in time for use next year.—[Lantern, June 2d.]

Dedication of Ohio Agricultural Experiment Station.

Quite a number of students and professors from O. S. U. attended the dedication of the Ohio Agricultural Experiment Station at Wooster on June 3d. Following is the program:

Music, Eighth Regiment Band, O. N. G.—American Overture—Catlin.

Prayer, Rev. S. F. Scovel, President University of Wooster.

Song, Wesleyan Male Quartet—"Sunday on the Ocean."

Address, His Excellency, Asa S. Bushnell, Governor of Ohio.

Address, Hon. J. H. Brigham, Asst. Sec'y of Agriculture, U. S. A.—"The Ohio Agricultural Experiment Station, Its History and Work."

Music, Band—"Gems of Steven Foster."—Tobani.

Address, W. I. Chamberlain, L. L. D., Associate Editor Ohio Farmer—"The Educational Value of Agricultural Experiment."

Song, Quartet—"A Little Farm Well Tilled."

Address, Dr. E. W. Allen, Assistant Director, Office of Experiment Stations, U. S. Department of Agriculture—"The Experiment Station Movement."

Music, Band—"Experiment Station March."—Miller.

Reception by the Governor in the Corridors of the Administration Building, 5 to 6 p. m.

In the evening the guests assembled at the City Park Pavilion, where the banquet was served. During the speeches of the evening Professor Wm. R. Lazenby was spoken of several times and received just credit for having been the person who

drew up the first experiment station bill in Ohio.

The guests were served with the following menu: Cream Chicken, Cold Ham, Tongue, Tomatoes Mayonnaise, Potato Salad, Olives, Midgets, Ice Cream Vanilla, Strawberries, Assorted Cakes, Fruit, Peppermint Creams, Coffee.

TOASTS.

Toast Master, A. D. Metz.—“Ride si sapis.”

The Station and the State, Hon. Asa Bushnell, Governor of Ohio.

“God Almighty first planted a garden.”—Bacon.

The Station and the United States Department of Agriculture, Hon. J. H. Brigham, Asst. Sec’y of Agriculture.

“The first farmer was the first man, and all historic nobility rests on the possession and use of land.”—Emerson.

The Station and the Farmer, Dr. W. I. Chamberlain, Sec’y Ohio State Board of Agriculture.

“Experience joined with common sense To mortals is a providence.”—Green.

Book Farming, Hon. Aquila Wiley,
“Blessed be agriculture; if one does not have too much of it.”—Charles Dudley Warner.

Barns and Banks, Col. C. V. Hard.
“I have done the state some service, and they know it.”—Shakespeare.

The Experiment Station and Congress, Hon. J. A. McDowell, M. C.

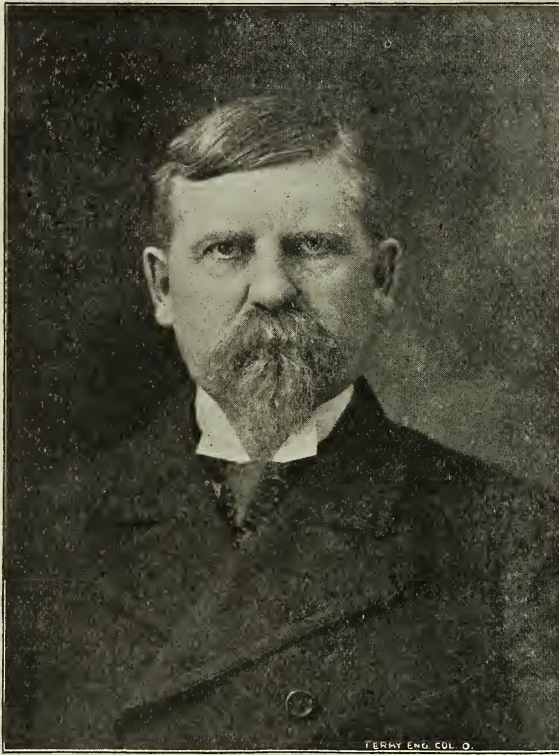
“There is more owing to her than is paid.”—Shakespeare.

The Columbus Horticultural Society held its regular monthly meeting in G. A. R. Hall, Westerville, Ohio, Saturday, May 22, at 2 o’clock p. m. Reports of standing committees were of special interest at this meeting. Prof. W. R. Lazenby read a paper on “The Care and Management of Flower Beds.” The members of the Society brought out many points of value regarding the keeping of home grounds. J. S. Hine made a report on entomology and Professor Lazenby showed some specimens of potted plants.

Our New Trustees.

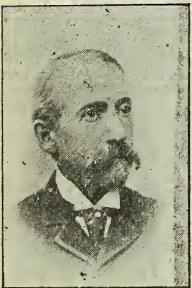
HON. JOSEPH H. OUTHWAITE was born in Cleveland, Ohio, in 1841, and was taken to Zanesville with his father’s family at the age of five. He received his education in the Zanesville public schools, but the removal of his father’s family to Western Pennsylvania necessitated his withdrawal from the High School before graduation. He taught school for one winter in Pennsylvania. In 1863 Mr. Outhwaite accepted a position as assistant in the Zanesville High School, which position he held for about two years. He was then appointed principal of what was then North School of the city of Columbus. This position he held for three years, meanwhile reading law and being admitted to the bar. He then went to Missouri and practiced law. While there he was twice nominated for Circuit Attorney. In 1870 he was married to Ellen R. Peabody, a daughter of the late J. D. Peabody, and a niece of George Peabody, the philanthropist. He returned to Columbus in 1871.

In 1874 Mr. Outhwaite was elected Prosecuting Attorney of Franklin County, and was re-elected in 1876, having no opposition in either race after the first nomination. At the close of his second term he was appointed one of the trustees of the Childrens’ Home of Franklin County. Shortly afterward he was appointed one of the trustees of the Sinking Fund Commission of the city of Columbus. He was elected to congress in 1884, and was re-elected four times in succession. At the close of his congressional career in 1895, President Cleveland appointed him the Civilian Member of the Board of Ordinances and Fortifications, which position he still holds. While serving in the House of Representatives he gained a national reputation as a statesman and a safe and reliable leader in the councils of his party.



HON JOSEPH H. OUTHWAITE.

His positions on important committees were numerous, and the faithful care, labor and study which he gave to all the duties of member enabled him to make a deep impression on the legislation of these ten years.



J. MCLAIN SMITH, recently appointed a trustee of the Ohio State University, was born at Troy, O., November 4, 1838. He removed to Dayton with his parents when a boy five or six years old, and

he has lived there, or in the vicinity, ever since.

He graduated at Miami University in 1859, receiving the first honor in

a class of thirty-two. He studied law in his father's office and was admitted to the bar, the late Senator Thurman being one of the committee signing his recommendation. For some years he assisted his father in his office work, but he took no active part in the practice.

In 1870 he was elected to the Legislature from Montgomery County, receiving the largest vote at that time ever given a member of his party. He served one term, but he soon found he was not adapted to political life, and he has not since been a candidate for office except to serve his neighbors in a local capacity.

Mr. Smith has always shown much interest in public affairs, and occasionally has taken an active part in political discussions. He was at one time owner and political editor of the Dayton Ledger, and afterwards occu-



HOME OF J. MCLAIN SMITH.

pied the same position on the Democrat. His politics, however, were not of a "practical" sort, and his writing was mostly confined to the discussion of economic principles. Of late years he has contributed regularly to the agricultural press, with an occasional article or address of a political or philosophical character. He represented the third congressional district as elector on the National, or Gold Standard, Democratic ticket.

In 1877 Mr. Smith removed from the city to his present residence, and he has since occupied himself largely in breeding fine stock. He has several times visited Europe, and he brought over the first herd of cattle ever imported directly to Montgomery County. He has made a number of different importations since, and has taken an active part in spreading the fame of Red Polled cattle. Since 1889 he has been Secretary of the National Association for the breed.

Mr. Smith's services have been in demand in a judiciary capacity, and for many years he has had large pecuniary interests entrusted to his

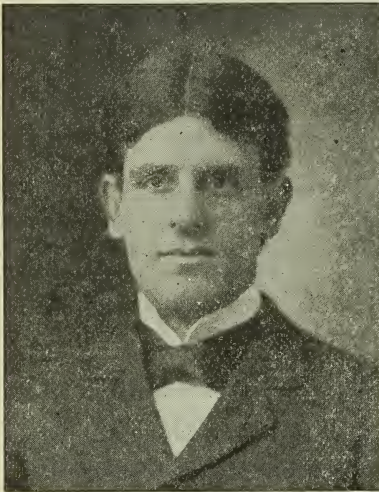
care. He was never married, and his leisure time has been largely devoted to reading and study, together with the improvement of his herd and the embellishment of his home. He has had some experience in educational matters, having served for many years as a trustee of his Alma Mater.

A Woman Manager.

The Acme Cycle Co., of Elkhart, Ind., has the unusual distinction of having for its manager a lady. Mrs. Otis D. Thompson is the only lady in the country who is director and responsible manager of a cycle manufactory. The company was originally organized by Mayor Thompson, and was the originator of the method of doing business in that line of commodities. While he lived he made a confidant of his wife in respect to his plans and hopes, and she was fully conversant with the purposes which he had in view. For more than a year Mrs. Thompson has been general manager of the company and has performed the duties faithfully, and very successfully. The prosperity of this company has been phenomenal and

has helped to keep the city remarkable for its prosperity in time of general depression. Its wheels are known and liked the world over, and their reputation for workmanship, for durability and for all the qualities that go to make up a good wheel is unlimited. The Acme Cycle Co. employs no agents, and allows no commissions, but deals directly with the purchaser. They are enabled in this way to furnish one of the best wheels of the country. Address the company at Elkhart, Ind., for catalogue.

Ernest Scott



was born at Athens, Ohio, and removed to Columbus with his parents in the fall of 1883. He is the son of Dr. W. H. Scott, late President of the Ohio State University, and Professor of Philosophy and Logic at the present time. Mr. Scott acquired his education by studying at home under the instruction of his father until time to prepare for college, when he spent one year in the public schools of Columbus. He entered the Ohio State University in the fall of '91, in the first preparatory class. Upon finishing his preparatory years he entered the long course in agriculture, and is candidate for the degree

of B. Sc. (in Agr.) at the coming commencement.

Mr. Scott has had many college honors thrust upon him during his course. He was twice honored by being elected president of his class. He won the silver medal in the competitive drill, and rose from private to lieutenant-colonel through all the intervening ranks. He was elected editor of the *Lantern*, but resigned soon after. He was treasurer of the Y. M. C. A., and held several offices in the Horton literary society. For the last two years he has devoted all of his time to his studies, letting college politics strictly alone.

He has always been extremely popular. By treating every one with due respect, and by his open, honest manner, he has placed himself high in the estimation of all, and we predict for him a successful career.

The Anatomy and Histology of the Brain of *Mus Musculus*.

BY ERNEST SCOTT.

In this thesis the author gives a description of the gross anatomy and the histology of the brain of the common mouse.

The gross anatomy is described from surface views and sections, and many drawings of the various aspects of the brain are made. The histology is worked out from serial sections, and at the same time especial attention is paid to the topography. Both longitudinal and transverse sections are used in this work to make it possible to get both views of all the internal structures of the brain.

The convolutions of the brain of this animal are few, but otherwise the brain is highly developed. The essential parts and their structure and functions agree of course with those of all the higher animals, including man. Thus the work done in this

thesis makes a good foundation for the study of the human brain, and this is what the author intends it for.

As most of the thesis consists in the drawings and their explanation, little more can be said of it in this short space.

Homer Charles Price,



the eighth son of Thomas D. Price, was born on February 13, 1875, near Newark, O. He received his early education at a district school, and in the fall of 1892 entered Doane Academy, Granville, O. He completed the scientific course in two years and in the fall of 1894 he entered the Agricultural College at O. S. U., from which he will graduate in June with the degree of B. Sc. in Agriculture. Mr. Price has been an earnest student, and success has always crowned his efforts at O. S. U. He is well known and is highly esteemed by all his friends. He has always taken an active part in college affairs and has been one of the leading members of Townshend Agricultural Society. He has served a term as president of the society.

The History and Characteristics of Red Polled Cattle—Abstract of Thesis.

BY HOMER C. PRICE.

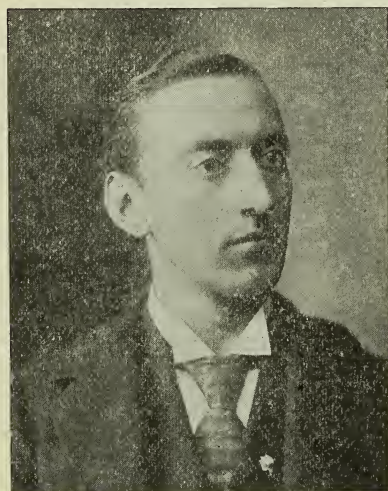
The author treats of the origin of domesticated cattle and of polled cattle. The old counties of Norfolk and Suffolk, England, the home of the Red Polled breed, are described, and an account of the early breeds of these counties, together with the method of management, is given. He then follows through the history of the two breeds, showing how they gradually became amalgamated into the one breed that is today known as Red Polled.

Short accounts are given of the early breeders and their efforts to develop and bring the breed before the public. The plan of the herd book, which is quite characteristic, is described, together with the founding of the Red Polled Cattle Club of America and the establishment of their herd book. The first importations to the United States and an account of the first importer is noted. He then gives a minute description of the breed as it exists today, and shows the characteristic points. A number of measurements made from the herd of J. McClain Smith, of Dayton, and Capt. V. T. Hills, of Delaware, O., are tabulated. Dairy tests made in private, and public tests in both this country and England, are given, together with block tests that have been made in the fat stock shows of England.

He closes his thesis with a chapter on the economic place for Red Polled cattle in Ohio, and the lines along which improvement should be sought. It is the writer's opinion that for the general farmer who breeds for neither dairy nor beef, but keeps a few cows and raises the calves, the Red Polled breed is well adapted, it being a true general purpose breed, good

both at the pail and on the butcher's block. He thinks that the improvement the breed needs is in its general purpose character—that neither the dairy nor beef quality should be improved at the expense of the other; that line breeding should be avoided, and that the ideal should be a *good* dairy cow and a *good* beef cow combined in one.

Marley Rollin Shellabarger



was born August 4, 1870, in Miami county, Ohio. Attended country school in the winter, worked on farm in summer. Attended the West Milton High school two winters, and in order to be at home morning and evening to do chores, drove 5 miles twice a day to and from High school. He attended the National Normal University at Lebanon one term, in the fall of 1891. During the winter of '92 and '93, he received the circular of the Agricultural course sent out by the Association of Agricultural Students, and decided that O. S. U. would be a good place for him to go. Entered O. S. U. in fall of 1893; expected to complete only the short

course. Before entering O. S. U. his father said it was foolishness to go there. After the first year of school was completed his father changed his mind and said he would like to have him complete the long course. Mr. Shellabarger has always felt a great interest in Townshend Agricultural Society, for it was largely through its efforts that he has attended the University. He expects to return to the farm upon his graduation. He has always been a prominent member of Townshend Agricultural Society, and is at the present time its president.

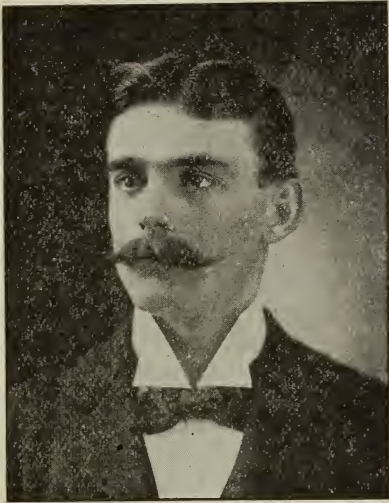
The Effect of Tillage on Soil Moisture.

(THESIS BY M. R. SHELLABARGER.)

Four experiments were made, covering a period of nearly one year. Two of the experiments were made on the effect of subsoil plowing on corn ground, and two were made on wheat ground. One of the latter was testing the value of subsoiling and the other the effect of different depths of plowing on wheat. In all the experiments the object has been to determine if subsoil plowing or deep plowing with the ordinary walking plow has any great effect on the amount of moisture the land may contain.

The summer of 1896 being an unusually wet season, the effect of subsoiling in the three experiments has not been marked. In the driest month the subsoiled plats showed a higher per cent. of moisture. In the fourth experiment there was in every month of the growing season two to three per cent. more moisture on the plat plowed ten inches deep than on the plat plowed four inches deep. In a dry season there would be considerably more moisture on subsoil land than on land not subsoiled, providing the soil is similar to that on which these experiments were made.

Philip Baer, Jr.,



was born September 28, 1870. He has always lived at home on his father's farm, near Canal Dover, Tuscarawas county, Ohio. Attended country schools until the age of 19, but usually missed part of fall and spring term to help with the farm work. Attended Dover High School two terms in two winters. Worked on farm in summer and at making saw logs and on saw mill in winter, until coming to the University in September, 1893. Worked two summer vacations on O. S. U. farm since entering college, and one at home. He has always taken an active part in college affairs, and has taken great interest in the work of Townshend Literary Society. He was president of Townshend one term during the present year. On account of his high aims and upright methods he is highly esteemed by all.

THESIS.

Determination of Carbon Dioxide and of Temperatures in Stables Under Varying Conditions of Ventilation.

BY PHILIP BAER, JR.

The object of this thesis is to ascertain the amount of impurity in the

air of barns where animals are kept, and to find out how near, in actual practice, such stables approach to perfect ventilation under varying conditions of ventilation.

The tests were made for the stable at the Ohio State University farm, containing 25 cows. The stable is an ordinary barn basement. Its dimensions in round numbers are 65 x 45 x 10 feet, allowing nearly 1,200 cubic feet of space to each cow. The east end is against the "bank" which leads to the drive floor overhead. The other three sides are unprotected, the outside ground sloping gently from the floor of the stable. The barn is boarded with ordinary drop siding with battens, glazed windows and ordinary fitting doors. The ceiling of the stable is a tight floor of matched boards. There are openings for two hay chutes and for a stairway.

Air of normal purity is absolutely demanded by all the higher animals for the sustenance of life, and for the performance of the exertions required of them. Air is required almost every instant that life endures, while food is taken only at stated intervals and may even be withheld for hours and days without the cessation of life. An animal placed in a vacuum will die in a few minutes.

Air, when pure, is a mixture of the following ingredients:

Oxygen 20.96% by volume; Nitrogen 79.00% by volume; Carbonic Acid .04% by volume; Watery Vapor, varies with the temperature; Ammonia, a trace; Ozone, organic and mineral matter in varying amounts.

The oxygen of the air is the element needed for the sustenance of life. No change is known to occur in the nitrogen when it is in the lungs; oxygen is taken up. Exhaled air contains about 5% of CO₂ instead of .04%, and about 13% of oxygen instead of 21%. Exhaled air is also loaded with watery vapor which contains organic matter.

The impurities of the air Dr. Angus Smith divides into *organic*, *inorganic* and *gaseous*.

Inorganic impurities in enclosures except where lights are burned, or in workshops, etc., are insignificant and comparatively harmless to animals.

Organic impurities are always found in the air where animals are kept. These exist in solid particles, as bacteria, pores of fungi, epithelial cells, and vegetable fiber. "The organic matter found in the air," says Dr. Smith, vitiated by respiration, "is made up of cast off epithelium from the mouth, air passages, and skin; organic vapors are from the lungs and skin; faeces in fine division, and vapors derived from the decomposition of materials from the intestinal and urinary passages. This organic matter is accompanied by carbonic acid gas and watery vapor. The vapor exhaled by an ox in 24 hours is equal to about $1\frac{1}{4}$ gallons of water."

Dr. Smith found, condensed from the air of a crowded room, a thick oily liquid smelling of perspiration and capable of rapid decomposition. If so much organic impurity exists in the air from the skin and lungs of human beings, how much more abundant it must be in stables where, in addition to that exhaled by respiration, the discharges from the bowels and kidneys contribute.

Dr. de Chaumont and others have shown that *the organic matter in air of buildings is in proportion to the amount of Carbonic acid of respiration*. Knowing this it is a simple matter to ascertain the impurity of stable air by determining the amount of CO₂. "The amount of CO₂ present is used as an index of the purity of the air." —Dr. Smith.

Impurities, if inhaled, go to be absorbed by the mucous membranes of the air passages and lungs. It is quite important, therefore, to have these impurities conducted to the outer air and replaced by fresh air.

The average of CO₂ in pure air is about .04%. If air is vitiated to the extent of .06% of CO₂, no bad effects are noticed; so *this is considered the limit of vitiation allowable for good ventilation*. That is, .02% CO₂ over and above the amount found in pure air is as impure as should be allowed for the health and vigor of the animal. This applies as well to man.

Impurities, if allowed to accumulate, can easily be detected by the sense of smell, and when so noticed it is a sure indication that the ventilation is not sufficient. When air smells "rather close" to one who has just entered an enclosure from the fresh air it is certain that too much organic matter is present.

A horse exhales about 6.5 cu. ft. of CO₂ per hour and an ox about 4.06 cu. ft. per hour. Now since the limit of vitiation is .02% CO₂ above the amount contained in pure air, or .0002 cu. ft. CO₂ in every cu. ft. of air may be added, the amount of fresh air required by a horse per hour would be $6.5 + .0002 = 32500$ cu. ft. That required by an ox per hour would be $4.06 + .0002 = 20300$ cu. ft.

The cubic space required by animals depends upon the number of times per hour the air can be changed. It is conceded that grown cattle should have 1000 cu. ft. of space each and horses 1500-2000 cu. ft. each.

Man requires 3000 cu. ft. of fresh air per hour, and owing to his liability to take cold if in a draft, 3 times an hour is as often as air can be changed in a room by means of natural ventilation. This means that man requires 1000 cu. ft. of space.

Samples of air were taken from the stable for the determination of the CO₂ for six different weeks. The conditions, regarding opening or closing passages for exchange of air, were left the same for a week at a time. The number of cows in the stable varied one or two for different weeks.

For the week February 3-9, the

hay chutes and stairs were left open and windows were opened when thought necessary for ventilation. It was the aim to have conditions the same as one would ordinarily ventilate a stable. The average daily temperature in stable for the week was 39 degrees; same average outside, 32.7 degrees. Average daily amount of CO₂ found was 8.02 parts in 10,000 parts of air.

The week March 25-31, one hay chute, stairway and 3 north windows were left open (windows were slanted inward at the top). The average daily temperature in stable was 46 degrees; that outside was 42.2 degrees. The average daily amount of CO₂ found was 9.99 parts in 10,000.

The week March 17-24, the conditions were the same except that the stairway was closed, leaving one hay chute and 3 windows open. The average daily temperature in stable was 55.2 degrees; that outside was 48.9 degrees. The average amount CO₂ found was 9.99 parts in 10,000.

The week February 26 to March 4, only one hay chute was left open. The average daily temperature in stable was 36.5 degrees; outside 29.6 degrees. The daily amount of CO₂ found was 10.05 parts in 10,000.

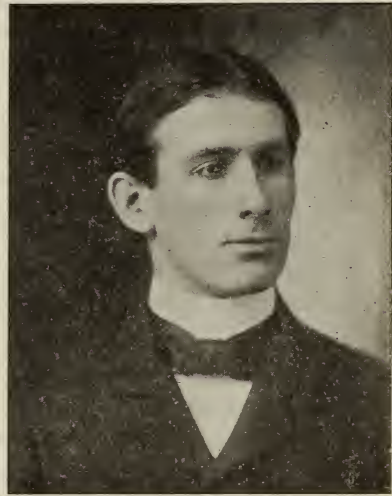
The week February 19-25, all passages were closed. The average daily temperature in stable was 43.5 degrees; outside, 36.5 degrees. The average daily amount of CO₂ found was 10.47 parts in 10,000.

The last week, April 21-27, all passages were closed. The average daily temperature in stable was 59.8 degrees; outside, 58.3. The average daily amount of CO₂ was 12.31 parts in 10,000.

It will be noticed that as the difference between the average daily temperatures inside and outside decreases, the amount of CO₂ increases, this difference of temperature being less as the outside temperature increases, and consequently the CO₂ is rapidly

increased as is shown by the results of the week February 19-25 and April 21-27. As these differences of inside and outside temperatures are due to the opening or closing of the air passages, the amount of CO₂ in general is due to the same cause. Perfect ventilation was not secured when passages were left open; 8 parts CO₂ were found where 6 parts CO₂ only are allowable for perfect ventilation.

John Ferguson Cunningham



was born in Afton, Iowa, in the year 1877. His father is a Presbyterian minister, and in 1881 came to Ohio, bringing his family with him. He lived at Mt. Sterling and Columbus, O., for several years, where John received his preliminary education. In the fall of 1891 John Cunningham entered the short course in agriculture at the Ohio State University. After two years in college, he remained out of college one year, and re-entered in the fall of 1894, as a sophomore in the class of '97, in the course of Horticulture and Forestry. He became a member of the Phi Gamma Delta Fraternity at this time. He was one of the founders of the Townshend

Literary Society and was its first librarian. Shortly after his entrance to the University he became a member of Horton Literary Society, and from his very beginning was one of the most lively members of this organization. For nearly a year he was Master of Programs of Horton and was honored by being her president in the winter term of '96-'97. He was Arbor Day orator, class of '97, in his Junior year. Was one of the first members of the O. S. U. Glee Club, and the present year its Secretary. He was a charter member of the Wheaton and Organic Evolution Clubs. Though very young he did ably on the football team, as left end. He is manager of the '97 second baseball team. From the first he has been an active and energetic member of the Y. M. C. A. and for some time was treasurer of the Y. M. C. A. board of trustees.

When THE AGRICULTURAL STUDENT was founded Mr. Cunningham was chosen as one of the department editors, and for the past year and a half has filled the chair of editor-in-chief. Too much credit cannot be given him for the untiring efforts that he has devoted to this work in the interest of the department of agriculture and the University. Mr. Cunningham holds the distinction of not only being a special student, but a general one. He is known and is popular throughout the University. A thorough scholar as well as a leader in every student affair. Glancing back over his college career we find him in nearly every organization, working hard and unselfishly for its advancement. Mr. Cunningham is a young man of unusual promise, of exceptional qualities and brilliancy of mind, and what is especially pleasing to note, he is a man in the highest sense.

C. W. B.

Comparative Test of Some of Our Native Building Timbers.

JOHN F. CUNNINGHAM

The object of this thesis is to present a concise treatise upon the relative qualities for building purposes of our four most common timbers: Yellow, Georgia or Long-leaved pine (*Pinus palustris*), Norway pine (*Pinus resinosa*), White pine (*Pinus strobus*) and Hemlock (*Tsuga canadensis*.) These are the timbers most commonly used in the building of frames, trussels, etc., or where strength is the requisite quality. The tests which I made were merely to verify to my own satisfaction the results of the U. S. testing laboratory at St. Louis, Mo.

The machine used in my testing, is the Universal Riehle Testing Machine, with a capability (with the sliding beam weights) of 40,000 pounds. The force is applied by hydraulic pressure upon a column of oil, the piston being worked by hand by the operator.

The tests in which I was principally concerned were those for transverse stress, end compression and transverse compression, as these are all that are necessary to determine the comparison with the "average quality."

The chief points that I have derived from my tests and reading, are the following:

1. In order to secure correct data upon the mechanical properties of our timbers, it is necessary to make a large number of tests in order to secure the average as well as the range of capabilities.

2. To make these tests practical it is necessary to bring the best results into comparison with the known physical and structural conditions

3. In order to deduce laws upon the relation of the mechanical properties to the structural and physical conditions, the history of the test material must be known.

These three facts are to be fully recognized before any successful work in timber testing can be done. "Such 'ring porous' woods, as the oak and ash, show the greatest elasticity when their annual rings are wide." In the conifers, according to Hartig, the slow grown timbers are the best. But Bauschinger showed, on the other hand, the tensile strength in pines was independent of the entire width of the annual rings, but dependent upon the proportion of the spring wood to the summer wood.

That wet soil produces brittle, and dry or fresh soil tough timber, remains to be proved. The degree of seasoning seems to increase its strength. Toughness, or capacity for bending without rupture, on the other hand, is said to be inversely proportional to the degree of seasoning.

Experiences With Hog Cholera at the University Farm.

For some time before the outbreak I noticed that one of the litters of small pigs was not doing very well; that is, they did not seem to grow any; hair became rough and skin scruffy. Later they became weak and staggered, having a diarrhea and also a cough. They became quite lousy, but the lice were soon finished by applications of kerosene, lard and sulphur mixed.

On November 3 I found one of the pigs dying. It seemed to be choking to death. Then, on November 27 another died, and in the same manner. This one and all that died later were taken to the Ohio State University veterinary hospital and post mortem examinations were made by Dr. White, assisted by Mr. Boyd (a student and assistant of Dr. Bleile in bacteriology), who did the bacteriological part of the work.

On December 2 another pig with which we had been experimenting died. This one and the one that died

November 27 showed no signs of cholera in the post-mortems, but the air passages in the lungs were found to be filled with worms (*strongylis paradoxus*). These are what caused the death of the pigs.

As only the small pigs were sick and the large ones appearing perfectly healthy, Dr. White thought the only real trouble was these worms, so we began a treatment for them. We shut the pigs up in a close pen and then kept the pen full of fumes from pine tar put on a heated shovel. We also gave them an injection into the trachea of 5 c. c of turpentine and olive oil, in the proportion of one part turpentine to ten parts of olive oil. The turpentine was used to kill the worms, and together with the pine tar fumes the irritation would be enough to cause the pigs to cough the worms up. But instead of killing the worms it only made them crawl back farther into the lungs, as was found by the post-mortem examination. (This is a successful treatment for the same trouble in sheep.)

About this time the sow began to look poorly, and appetite was also very poor. I then got a prescription filled which I got from Farmers' Bulletin No. 245, United States Department of Agriculture. This was said to be a good cholera and swine plague preventive. I then gave it according to directions to all the hogs. The sow began to get worse. I noticed she did not come for her feed as soon as she had been in the habit of doing, and was moping around and feverish. We at first thought it was caused by taking the pigs from her a day or so before. A day or two afterward she refused to eat, and had a high temperature and a violent diarrhea. This we tried to check by drenching her with calomel and opiates, but they did her no good as she vomited them up immediately. On December 5 she died, and the post-mortem showed that she had the cholera. This the

veterinarians knew by the characteristic ulcers found on the inner lining of the digestive tract, and also by bacteria cultures made from the blood of both sow and pig. The germs in each case proved to be alike, and were compared with some permanent mounts made by Mr. Boyd from hogs which had the cholera.

After this we had no doubts as to what the disease was, so we began a treatment by giving ten (10) drops of carbolic acid to each 100 weight of the animal in the drinking water of the sick ones, and one-half that quantity to the others.

On Dec. 8 two more brooding sows became sick. They vomited up all their food in an undigested condition and had a diarrhea. These symptoms came on very quickly, as they did not show their condition as the other had. Profiting by the experience gained by treating the other sow, I decided to give them a dose of carbolic acid immediately, and not wait for them to drink it when they got ready. This I accomplished by holding them with a rope round the upper jaw behind the tusks (same as in ringing). Then I obtained a pointed leather shoe and cut off the upper and a hole in the toe. This I shoved into the hog's mouth and then poured the acid diluted with water into the shoe, the contents going back into the hog's throat forced them to swallow it. (There is no danger of strangling a hog by this manner of drenching, as they cannot squeal.) I drenched them again that night and the next day they did not object to drinking the water with acid in it from the trough, especially as they were feverish and could get nothing else to drink. One of the sows was as well as ever in a few days while the other sow remained sick for two weeks, but finally recovered.

From Dec. 15 to Dec. 25 four more pigs died, the post mortems showing in each case that it was cholera and was becoming more pronounced. On

Jan. 5 I killed a pig with an ulcer on its lower jaw. The flesh had begun to slough off. This was what I was told was the chronic skin form of the disease. We had no more cases after that.

We lost nine out of twenty-eight or about 30 per cent. In all but one case it was fatal with the small pigs. Two brooding sows and a shoat recovered while the younger brooding sows and fattening hogs did not get it, as they were removed to a pen out in the pasture field and another person fed them. I did not go near them nor did their attendant come near the sick ones, so by isolating them we no doubt saved them from an attack.

In case of another attack, I should follow the same plan of separating and treat all with carbolic acid. The acid in all cases stopped the diarrhea in a few hours and in the case of the older hogs cured them, and I am inclined to believe that if the worms could have been gotten rid of that we might have been able to save a few of the small pigs, although it is generally fatal with young pigs.

Occasionally I put a few drops of the acid in the drinking water. This will do the hogs good, especially if a disease is developing in the digestive tract caused by bacteria. The acid will kill the germs, as they cannot live in an acid medium.

As to the hog cholera preventive, I fed that for quite a while, but discontinued it on account of the cost, which was about 30 cents a pound. I now give them eight parts of salt to one part of sulphur and plenty of wood ashes.

It has been a puzzle to us how the disease got here, as we have not had a case on the farm since six years ago.

C. N. MOONEY.

Growing and Feeding Soiling Crops.

Soiling crops may be divided into two classes; those sown or started the previous season, and those sown

in the spring. Of the first class, rye is the earliest. If sown early on rich soil it can sometimes, in northern Ohio, be cut by April 20 or May 1. Its chief value lies in its earliness. Its season does not extend over two or three weeks. By the time it is fully headed out it becomes hard and unpalatable and stock will not relish it.

By the time rye is past its best, wheat can be used until clover is in bloom. Wheat is a little more expensive, but it makes a better feed. Stock relish it very much, and will eat it up clean until nearly ripe. Both rye and wheat, when cut early, will make a second growth, from a fourth to half as much as the first crop, depending upon the season. Clover is, however, our main dependence for early summer feed. It is a well-balanced ration and one of the most productive, cheapest and most satisfactory forage plants the farmer can grow.

The possibilities of an acre of clover on rich soil are very great. As I said in No. 2 of this series, I have cut the common red or mediums three times in a single season without apparant detriment, the second season's growth being as heavy as the first. While it will not produce as many tons per acre as Indian corn, it costs less to grow it since it requires no special preparation of the soil, and no cultivation while growing.

Of the spring-sown crops, oats and peas can be sown the earliest. They are both very hardy and on high ground, when there is no danger of standing water, will stand a great deal of bad weather unharmed. I have known oats to lie in the ground four weeks, and come out all right. We use the Canada field pea and sow about a bushel per acre, and at the same time sow about a bushel of oats per acre. It is best to sow them separately. The peas being heavier than oats, it is difficult to sow them evenly after being mixed. Peas should be

sown quite deep. Some recommend plowing them under about four inches and sowing the oats afterwards, either broadcast or drilled. We sowed about two acres of oats and peas, March 20, and they are growing nicely. They can be sown as late as May and yet do well. Peas are very rich in nitrogen and are a valuable feed for milch cows and pigs.

All soiling crops should be grown near the stable for convenience in feeding. It is advisable to feed the milch cows in their stalls, about milking time. The feed for young cattle should be put in racks or mangers—out doors if preferred—but never thrown promiscuously on the ground, much of it to be wasted. On a small farm a wheelbarrow or hand-cart can be used for transporting the feed; on a larger farm, when the amount of feed handled is much more, it will be necessary to use a team and wagon. We constructed a truck from four old reaper or mower wheels at a very little cost that answers the purpose admirably. We drive into the floor above the stables and dump the feed through a chute into the feed-room below. When feeding corn, during August and September, it is first run through a feed cutter on the same floor, the carrier conveying it into the then empty silo.

For fall feeding, either in complete soiling or as a supplement to the failing pastures, there are few crops more satisfactory than corn. Many farmers make great mistakes in planting it. They sow it broadcast or drill it thickly with a common grain drill. It makes a large amount of feed when planted this way, but the quality is not of the best. Any forage plant, to develop into first-class feed, must have air and sunshine. When too much crowded it gets a pale, sickly color, especially near the ground, and is of little value for feed. It is too watery. It lacks the deep, rich, green color that the same variety of plants get when not

planted so thickly. It is also much more liable to lodge, which makes the harvesting more difficult and expensive. It has the advantage, however, of not requiring any cutting before feeding.

When corn is planted rather thinly the stalks will be large and heavy, and will nearly all produce an ear. In order to feed without waste, it should be cut. We have tried both the native and large southern varieties, and in the future will plant nothing but the southern or "B. & W." variety. It produces about one-half more feed per acre, and I see no reason why the quality is not equal to any. Some advocate planting sweet corn, but after having tried it I find nothing in its favor unless one is situated near a good market for green corn; then by planting very early the ears could be sold to a good advantage and the remainder fed to stock. It does not grow so tall, and must be planted closer, making the expense for seed some greater. We tried sorghum several years ago, but do not like it as well as corn. When sown in drills about as thick as ordinary field corn, and cultivated, it does fairly well, but grows very slowly at first, and resembles grass so much that it is difficult to keep it clean. If sown or drilled thickly it is open to the same objections that corn is. Corn is, beyond a doubt, the best and cheapest feed for fall soiling and winter feed in the shape of silage. Producing such an enormous amount of feed per acre, it will continue to be our main crop until we find something better. We always sow the ground to wheat or rye after the corn is removed. The continued cultivation necessary for the benefit of the corn is an excellent preparation for the fall seeding. It is like a summer fallow. It is cultivated and drilled without any further preparation. I believe it is best not to plow it. The soil being compact and fine, makes a very good seed-bed. If

plowed during the hurry of fall work it is apt to be sown without sufficient preparation, to the injury of the following crop.

The use of the silo in connection with soiling is gaining favor. Some use a silo large enough to hold feed for the entire year, and depend upon corn entirely for filling it. This may or may not be the best plan. I am certain it would be very convenient to have the feed all prepared and under cover, where access can be had to it at all times regardless of the state of the weather. When depending upon bringing in the feed every day or every second day, it sometimes happens that it is rainy and disagreeable. On the other hand, I would suppose that stock would tire of one kind of feed the entire year, even though palatable as silage, and not eat readily. Animals demand a variety of feed to do their best, and it pays to cater to their demands. The making of silage from clover and rye for summer feed has been tried with but partial success. Experiments at different stations have not been as successful as was hoped.—O. J. Vine in Ohio Farmer.

Canton, O.

O. S. U. Dairy Notes.

Don't make the mistake of feeding the calves oil meal with skim milk, for both these foods are rich in nitrogenous matter and poor in fat and carbohydrates; but rather feed a grain rich in fat and starchy matter, with the skim milk.

When the young calves are affected with scours, the most effective remedy we have tried is to feed them shorts. Most dairymen and farmers usually have shorts on hand, and the remedy is easily applied, as the calves eat the shorts readily. This treatment is fully as effective for mature animals.

Feeding ensilage in the stable while the cows are running on pasture has not proven satisfactory with us owing to the fact that the silage, as well as the grass, is a watery, bulky food, and the grass being the more palatable they fill up on it, and then when they come into the stable they eat only the grain and finer parts of the silage. The coarser portions which are left in the boxes, if not removed at each feeding, soon heats and moulds, causing a sour, musty smell in the barn. This, however, may be overcome by hauling the silage out in the pasture and scattering it on the grass. The cows will eat it up fully as clean as when fed in the stable.

During the wet spring weather, cows that run in muddy yards are often troubled with sore feet. The membrane between the toes, and sometimes around the upper edge of the hoof, becomes irritated and often cracks, making a foul smelling sore from which, in aggravated cases, the cow becomes very lame. We have treated a number of cows this spring, and the treatment given below has effected a speedy cure without a single failure:

Thoroughly cleanse the foot in lukewarm water, and after having firmly secured the foot, apply a solution of butter of antimony to the sores. Have a quantity of oil present (castor oil is good), and in about two or three minutes after applying the butter of antimony saturate the affected parts with the oil. The oil neutralizes the antimony and prevents it from eating too deep into the flesh.

M. I.

History and Work of Experiment Stations.

The beginning of experiment stations dates back to 1843, when Sir J. B. Lawes, a wealthy English land owner, associated himself with the chemist, Dr. J. H. Gilbert, for the in-

vestigation of agricultural problems in the fields and laboratories of Rothamstead farm. The work there has been carried on in a scientific and systematic manner until the present time. And the practical value of their published reports has made the names of Lawes, Gilbert and Rothamstead farm familiar in every place where agricultural investigation and experimentation is carried on. This however was not an experiment station proper, because the work was carried on at private expense.

It was left for the Germans, so often at the head in scientific affairs, to establish the first experiment station, which was organized at Moeckrn in 1851, with the now famous Emil Wolff at its head. The usefulness of this station became known so quickly and spread so rapidly that twenty-five years later there were 122 experiment stations in Germany. In most cases their income was derived from receipts for professional work or from contributions of private individuals. Today there are more than 200 agricultural experiment stations in Europe.

The experiment station movement in the United States probably had its origin in 1858, when Professor S. W. Johnson, the great agricultural chemist whose name is made famous by his two books, "How Crops Grow" and "How Crops Feed," made analyses of several brands of commercial fertilizers in his private laboratory and exposed glaring frauds in the trade. This brought to the minds of Connecticut farmers the necessity of inspection. With this impetus, the movement was started for the establishment of the first station in America at Middletown, Connecticut, in 1875. The legislature appropriated \$2,800 per annum for two years, to which \$1,000 was added by the late Orange Judd. The use of the laboratory and apparatus in the Orange Judd Hall of Natural Science was given by the

trustees of Wesleyan University. The work of the station was carried on in a limited way by the professors, who could spare only a small part of their time from University work. But the station grew in popularity as the published reports were read by the people, and in 1877 it was permanently established by the legislature appropriating \$5,000 per annum for its support. The management was placed in a board of control and the station moved to the Sheffield Scientific School of Yale College at New Haven.

The North Carolina experiment station was next established. It was organized in 1877 by the state department of agriculture. Its income was derived from the license tax paid by the manufacturers of commercial fertilizers.

The Cornell University experiment station was established at Ithaca, N. Y., in February, 1879, with a board of control consisting of the faculty of agriculture in the University and the presidents of various agricultural societies throughout the state.

In 1883 the Massachusetts legislature founded a station at Amherst with an appropriation of \$8,000 per annum.

The Ohio station was organized in 1882 with an appropriation of \$3,000 per annum.

Certain lines of experimental work were also carried on at many of the agricultural colleges which were established, one in each state by the land grant of 1862. In the agricultural colleges of California, Kansas, Missouri, Maine, New Hampshire, Mississippi, Pennsylvania, South Carolina, Colorado, Illinois, Michigan, Wisconsin and others, important work was done by means of funds provided by the colleges.

From 1862 till 1878 all the experimental work was done by the agricultural colleges and a few scattered stations which had been established

by small appropriations from state legislatures. But the work done, as shown by their published reports, was of great value to the farmers, and so the experiment station movement gradually grew and prospered even under adverse circumstances. In 1887 it was made national by the passage by congress of the bill known as the Hatch act, which provides \$15,000 annually for each of the states and territories having an agricultural college, to be used in maintaining an agricultural experiment station. This led to the establishment of new stations, or the increased development of those already established under state authority. A later appropriation of \$728,000, of which \$20,000 was for the Office of Experiment Stations at Washington, D. C., provided for additional stations in several of the territories. To-day we have in the United States, excluding branch stations, fifty-four experiment stations. Fifty-one of these stations receive the government appropriation as mentioned above, while the others are maintained by state aid. The employes of these fifty-four stations number 557, most of whom are scientific men who devote the greater part of their time to experiment work.

The Office of Experiment Stations at Washington is one of the divisions of the Department of Agriculture and has at its head a director and assistant director who are appointed by the Secretary of Agriculture. The Office of Experiment Stations exercises a supervising control over the stations by collecting information regarding the character and results of experiments in progress. Synopses of these are published in the Experiment Station Record and distributed to all station workers, who, by reference to it, know what is being done at every other station. The Office of Experiment Stations also publishes Farmers' Bulletins for free distribution among farmers of the United

States. These bulletins are usually prepared by specialists in some line of scientific and practical agriculture and are intended to be practical and to the point. They may be obtained from the Secretary of Agriculture, Washington, D. C.

Farming is a continual experiment with crops, rotations, implements, methods of tillage, foods, etc. We do not often stop to think that every farm operation is the result of our own or others' experiments. Many times these experiments are costly and cannot be afforded by the average farmer.

Every important manufacturing establishment has its trained chemists or skilled mechanics working on new processes or inventions. Because of the difficulties connected with this kind of work much money and labor are often expended with but little visible results; nevertheless it is found to be profitable. What manufacturers are doing for themselves in this line the government is doing for the farmer in maintaining our agricultural experiment stations in each state and territory of the United States. They seek answers to the questions which agricultural practice is continually asking as to the tillage of soil, action of manures, cultivation of crops, breeding of live stock, foods and feeding of all breeds of live stock for various purposes and in all stages of growth, the composition and nutritive value of feeding stuffs, the production of milk and cheese, the diseases of plants and animals, and in general whatever the farmer needs to know and experimental science can discover. Hundreds of problems are being investigated which are of direct practical value. As an example, take a single experiment from the Illinois station, entitled, "Corn, depth of Cultivation." Tests were made on a large number of plants for five successive years. The shallow cultivation was done with the Tower culti-

vator, having long, broad knives which scrape the soil to a depth of from one to two inches. The deep cultivation was done with the ordinary four shovel cultivator, running to a depth of four inches. The average yield of shelled corn per acre is 5.9 bushels more for the shallow culture than for deep.

According to the last census there were 72,000,000 acres of corn in the United States. Suppose that shallow culture had been practiced and thereby increased the yield, we will say, three bushels per acre; there would have been an increased yield of 360,000,000 bushels. At twenty cents per bushel this increase would amount to \$72,000,000. This extra yield would have been produced without any additional expense in cultivation. The total amount annually expended in the maintenance of agricultural experiment stations in the United States is only \$1,000,000, an insignificant amount compared with the great benefits derived from the expenditure. This is only one of the hundreds of problems that the experiment stations are working on; only one of many practical questions that have been answered by the stations.

Agricultural experimentation is a slow process, and often requires repeated trials, extending over a series of years, to prove a given method. Many difficulties are also encountered in the way of conditions and circumstances which creep in and cause errors, or at least modify results. This fact shows the necessity of having the work done by carefully trained scientific men. One example will serve to illustrate. Take a simple variety test of wheat. Suppose we have fifty varieties. The seed having been obtained from its various sources, the first thing is to select a piece of ground and decide upon the size of plats. Of course we want a piece of ground with uniform

exposure, drainage, and natural fertility, the whole of which has been subjected to like cropping and application of manure. But it being impossible to obtain a perfect piece of ground we must accept the best that is available. The plats are treated to like preparation, and are carefully measured and staked out, and by means of a reliable machine are drilled. The kernels of some varieties being larger than others, we find that the drill did not seed at a uniform rate, thus affecting the amount of seed sown. Again, these varieties having the larger kernels will contain a less number of them in a bushel, thus decreasing the number of plants. The per cent. of seed germinating may have been different, still further affecting the number of plants in given areas. In all probability the fertility will not be uniform nor drainage alike in all parts. Heavy rains may cause the washing out of parts of some plants. One part of the field may slope to the north and another to the south, thus causing a greater amount of freezing and thawing in one place which would be detrimental. A fence on the western border may cause drifting of snow which will protect that portion. Some tall trees not far from the east may influence that portion by keeping back the morning sun. A horse, or "town cow," may find access to the field and eat a portion of a plat and lie down on the remainder. Some neighbors' chickens or turkeys may find some of the plants a good place to feed, or a squirrel or mole may be industriously at work undermining a portion of the field. After the grain is carefully harvested and in the shock the sparrows from a neighboring barn may come in large numbers and thresh the shocks nearest their home. The harvest time and threshing also bring their share of difficulties and so it is with almost every experiment.

Notwithstanding the difficulties and perplexities of the work, many important problems have been solved. The Babcock test for butter fat, alone, is claimed by many to be worth more than the entire expense of the stations. The study of the problems of feeding, of dairying, methods of crop culture, diseases of animals, the spraying of fruit trees, all have been investigated. In some cases our old practices have been revolutionized, or at least changed materially. Again, discoveries have been given to the farmers that are of immeasurable value.

At first the stations were handicapped because of poor equipment and scarcity of men who were qualified to carry on scientific investigation, but now, with improved appliances and a corps of trained men, the stations are doing better work than ever before. They are demonstrating that the rational system of agriculture has its foundation in science and that success in farming depends more upon skill and intelligence than upon muscle and ignorance.

The farmer should look to his experiment station as his friend and helper. The station publications contain reports of experiments and are sent free upon request to all persons engaged in farming who reside within the state. These bulletins are written by trained specialists and are edited in a plain, practical way so that any one who can read may understand them.

It is the earnest desire on the part of all station workers to bring the stations and their work closer to the farmers. When this is done we may expect the greatest good to come from agricultural experiment station work.

PROF. W. D. GIBBS.

Book Reviews.

The Fertility of Land, just issued by the MacMillan Company, New York City, is a summary sketch of the

relationship of farm practice to the maintaining and increasing of the productivity of the soil. The work is from the pen of Professor I. P. Roberts, of Cornell University. It is strictly a philosophy of field agriculture. In it we have the result of a long life teacher, experimenter and farmer. It is not a compilation of theories, or of figures, but the opinion of an agricultural expert on farm methods. We know of no other single book that comes nearer being a safe guide for farm methods and farm practice, than this. There is not a dry line of reading in the book. In a graphic style it treats of the Inventory of the Land; Evolution of the Plow (fully illustrated); The Means and Philosophy of Tilling the Land (telling how and why we should harrow, plow, etc.); Conserving Moisture; Irrigation and Drainage; Manures (treated in all their phases); Nitrogen, Potash and Phosphoric Acid; Lime and other Dressings; Commercial Fertilizers and the Use of Clovers, Fallows and Rotations. Every student of agriculture should have this book. It should be in the library of every wide-awake farmer and progressive grange. We have no hesitation in saying that it is the most valuable work on this general subject that has ever been published. It is intensely practical and easily understood.

The book is published by The Mac-Millan Company, New York; price \$1.25. It will be sent prepaid on receipt of price.

ADVICE TO FARMERS.

How to Market Their Crops to the Best Advantage.



The Chicago Board of Trade market has in it buyers for the whole consuming world. When the Farmer Commission House offers the

farmer's grain for sale in this market, there is a great difference between selling grain that way and the old way of farmers hauling it, in many instances, to a one-man market at home. We have asserted time after time that the tendency in all lines of business is to omit the middleman and bring producers and consumers closer together. Our farmer friends know that the whole plan of direct shipments to the Chicago market is based on this idea. Leaving out the middleman adds to the price obtained for the farmer's products; therefore we say, Farmers, ship your grain, seeds and live stock to Chicago where there is a broad competitive market and save middleman's commission. Have you ever taken to yourself this advice which we have been giving for so many months through these columns?

There is no reason why farmers should continue hauling their grain to their nearest station, selling it to the home grain buyer for whatever he chooses to offer for it, when they can ship it themselves and obtain as much for it as the grain buyer receives. The commission for selling shelled corn and oats by the car load is only $\frac{1}{2}$ c per bushel, it thus costing the farmer who ships but a single car load no more than it does the regular buyers who ship hundreds of cars annually. "It requires more brains, more alertness, to sell a crop judiciously than to raise it."

When shipping to Chicago, the greatest distributing grain market in the world, farmers give only the legal number of pounds to a bushel, i. e., 60 lbs. wheat, 56 lbs. corn or rye, 48 lbs. barley, 32 lbs. oats, no dockage—receive official weights, state inspection and get paid for all the grain they sell; being in striking contrast with the methods practiced at many of their home stations. The disposal of his grain in a business-like way, thus securing the best price possible,

is fully as important to the farmer's prosperity as to raise big crops.

This advice is intended for every farmer reader. He should act upon the advice given in these articles, and not only take advantage of the knowledge which he gains from these articles to better himself, but he should disseminate the information broadcast through telling it to his neighbors and interest them, when his neighbor who in turn becoming interested will help to spread the news in the same way, and so on ad infinitum.

Every reader must do just this, which must necessarily prove a benefit both to him and his neighbors. Reader, make yourself the prime mover in inaugurating or starting in your neighborhood this new plan of farmers disposing of their crops in a more advantageous manner instead of sitting supinely down and expecting your neighbor to do it for you. This is something which must be participated in by each one for them to be able to reap the full benefits out of it and through it becoming universal, the old methods will become revolutionized, and it will add hundreds of millions of dollars to the wealth of the agriculturists of the Northwest. Try it and be convinced. See what some farmers say who have already tried it. Mr. M. R. Van Schaick, of Rochester, Minn., writes: "Yours with check for \$194.71 received. I made \$30.00 on the shipment." Mr. D. Collins, of New Hampton, Iowa, writes: "I am well pleased with the result of my shipment, as I made about 2c per bushel more than I could get here." We have thousands of similar letters from farmers who have tried our plan. H. H. CARR & Co., The Farmer Commission House, 94 Board of Trade Bldg., Chicago.

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